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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/033,549	12/27/2001	Pavel G. Polynkin	2102393-991130	7501

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EXAMINER	
STAHL, MICHAEL J	

ART UNIT	PAPER NUMBER
2874	

DATE MAILED: 08/05/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/033,549	POLYNKIN ET AL.	
	Examiner	Art Unit	
	Mike Stahl	2874	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 May 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-29,31,32,35 and 36* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-29,31,32,35 and 36* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 December 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☒ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☒ Interview Summary (PTO-413) Paper No(s)/Mail Date. *0404*.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on May 24, 2004 has been entered. Claims 1-29, 31-32, and 35-36 are pending.

Oath/Declaration

The oath or declaration is defective. A new oath or declaration in compliance with 37 CFR 1.67(a) identifying this application by application number and filing date is required. See MPEP §§ 602.01 and 602.02.

> The oath or declaration is defective because:
> It does not identify the mailing address of each inventor. A mailing address is an address at which an inventor customarily receives his or her mail and may be either a home or business address. The mailing address should include the ZIP Code designation. The mailing address may be provided in an application data sheet or a supplemental oath or declaration. See 37 CFR 1.63(c) and 37 CFR 1.76.

Applicant's remarks in the May 24 2004 response regarding the pending submission of a new declaration are acknowledged.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are

such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-11, 32, and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stafford (US 5504575) in view of Tobias (US 5483335 ~~cited above~~).

Stafford discloses an apparatus (fig. 3) including an input port (e.g. via slit **60**), a wavelength-disperser **80** that splits the input signal into a number of spectral channels, an array of beam-manipulating elements **93** positioned to correspond to the channels, and an optical detector **100**. The beam-manipulating elements are individually controllable so as to be capable of directing spectral channels into the detector concurrently, and capable of directing spectral channels into the detector in a time-division-multiplexed sequence. Note the description at col. 6 line 59 – col. 7 line 3, in which various groups of channels are directed into the detector sequentially, while each channel of a given directed group is directed concurrently into the detector.

Stafford does not disclose an array of optical detectors including a plurality of detectors each corresponding to a unique spectral channel. However, it is already known in the art to use an individual detector for each spectral channel. Tobias teaches that array detectors are advantageous over single detectors for spectroscopy because they enable analysis of multiple wavelengths simultaneously instead of sequentially, and have an increased signal-to-noise ratio (col. 4 lines 40-50). It is further noted that the Stafford device is applicable to visible wavelengths (abstract; col. 2 lines 8-10), and that Tobias teaches that array detectors for the visible spectrum are effective and relatively cheap (col. 1 lines 50-59). Thus it would have been obvious to a skilled person at the time the invention was made to modify the Stafford apparatus by including additional photodetectors in an array in order to achieve the benefits taught by

Tobias. The modified Stafford apparatus satisfies claim 1, and the method of using it satisfies claim 32.

As to claims 2, 4, and 35, in one embodiment the beam-manipulating elements **93** are rotatable micromirrors (col. 3 line 67 – col. 4 line 15; claims 1 and 6). As to claim 3, the micromirror devices (DMDs) used by Stafford and disclosed in Hornbeck (US 5061049) are micromachined silicon mirrors.

As to claim 5, the micromirrors are used as shutters. As to claim 6, the shutters may alternatively be liquid crystal shutter elements (col. 4 lines 46-49; claims 1 and 7).

Regarding claim 7, the dispersing element **80** is a prism in the exemplary embodiment, but may alternatively be a transmission grating (col. 3 lines 61-63).

As to claim 8, Stafford teaches that the detector may be any conventional spectrometer detector. All the recited types of photodetectors are conventional and widely used. It would have been obvious to a skilled person to use any suitable conventional photodetector array in the Stafford device since a conventional photodetector would be less expensive and easier to replace than a rare or exotic type of photodetector.

As to claim 9, it would have been obvious to a skilled person to further modify the above combination by incorporating an input optical fiber with a fiber collimator at the input port, since this would advantageously enable processing of signals from a remote optical source. As to claim 10, it would further have been obvious to use a single mode fiber in particular, since this would reduce the undesirable modal dispersion effects associated with multimode fibers.

Regarding claim 11, Stafford does not disclose a beam focuser which focuses the spectral channels into corresponding focused spots. However, it would have been obvious to a person

having ordinary skill in the art to provide an array of lenses spaced congruently to the array of fibers **92** in the fig. 3 device in order to maximize the efficiency with which light is coupled into the respective fibers. This would be beneficial since in a spectrometry application it is generally useful to accept as much of the original spectrum as possible without distorting it by unnecessary losses.

Claims 18-29, 31 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stafford in view of Tobias as applied above, further in view of Braun et al.

Stafford does not describe a beam focuser that focuses the dispersed channels onto the corresponding beam-manipulating elements **93**. However, it would have been obvious to a person having ordinary skill in the art to provide lenses to focus the respective channels onto the input end of the corresponding fibers **92** (which ultimately conducts the associated channel to its beam-manipulating element) since it is well known that the transmission efficiency of an optical fiber is extremely sensitive to misalignment, and since the core diameter of an optical fiber is usually much smaller than the outer diameter of the fiber. It would be especially important to maximize the power coupled into the fiber for each channel when the device is used to measure the relative intensity of the channels. Furthermore, the use of lenses to couple light into optical fibers is routine in the art.

Stafford also does not disclose a polarization separator or rotator as required by claims 18 and 36. Braun discloses a general technique for handling signals with orthogonal polarizations as described above. It is noted that while a prism may not be as polarization-sensitive as a grating, it would still be important to have the polarization components properly aligned when

passing through LCD shutters, which are used in an alternative embodiment of Stafford and which are typically polarization-sensitive. In another alternative embodiment, a grating may be used instead of the prism as noted above. Therefore the technique taught by Braun would be useful in achieving proper orientation of the polarization components of an input signal in the Stafford device. Accordingly it would have been obvious to a skilled person to provide a polarization splitter, a polarization rotator, and an additional spatial light modulator array **90** in the above-proposed Stafford/Tobias combination in order to enable the handling of signals with orthogonal polarizations. The proposed modification and its method of use would have met the limitations of claims 18-27, 29 and 36.

As to claim 28, it would have been obvious to include a fiber with a fiber collimator as argued above with respect to claim 9.

As to claim 31, it would have been obvious to use any of the recited types of photodetectors as argued above with respect to claim 8.

Claims 12-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stafford et al. in view of Tobias as applied above, further in view of Saunderson (US 3090278).

As to claim 12, Stafford does not disclose a reference signal and a reference position-sensing element. However, it is well known that optical elements such as the prism **80** in Stafford need to be precisely aligned for proper operation and that ambient conditions (e.g. temperature changes or vibrations) can cause misalignment. Stafford does not mention any means for correcting and maintaining the alignment of prism **80**.

Saunderson discloses a spectrometer system. In the fig. 2 embodiment, a reference signal ("monitor radiation") of a particular wavelength is applied to the input port along with other wavelength signals (see also claim 1). The reference signal is diffracted from the grating **28** and propagates to a position-sensing element which includes elements **94-110**. The photomultiplier tubes **102** and **104** generate drive signals for a servo motor **48** that controls the alignment of the grating (fig. 1). The drive signals are representative of the grating position as described at col. 3 lines 29-51.

The overall alignment technique taught by Saunderson is applicable to the spectrometer disclosed in fig. 3 of Stafford. It would have been obvious to a skilled person to further modify the Stafford/Tobias combination in the manner suggested by Saunderson by providing a reference wavelength signal, a position detector for that signal, and a servo device responsive to the position detector for controlling the position of prism **80** in order to maintain correct alignment of the prism with respect to the other components of the arrangement. The proposed further modification would have satisfied the requirements of claims 12, 13, 15, and 17.

As to claim 14, it would have been obvious to a skilled person to further modify the above combination by incorporating an input optical fiber with a fiber collimator at the input port, since this would advantageously enable processing of signals from a remote optical source. An optical combiner would inherently be included in the proposed modification since there must be some way of getting the reference wavelength signal into the fiber.

As to claim 16, since the reference wavelength signal would be refracted from prism **80** along with all the other input wavelength signals, and since the other signals are already incident on the beam-manipulating elements **93**, it would have been obvious to a skilled person to locate

the position-sensing element with the beam-manipulating elements **93** for simplicity. It is noted that Saunderson places the position-sensing elements in the same array as the exit slits (such as **34** in fig. 1), and the exit slits essentially correspond to the beam-manipulating elements **93** of Stafford. Moreover, although Saunderson teaches adjustment of the disperser position, a skilled person would have understood that the disperser could be fixed while the slit / PMT array is moved. Thus in the combination proposed above it would have been obvious to such a person to fix the grating position while rotating the element array **90**. One motivation for this alternative arrangement is that the array **90** would be more susceptible than the prism to misalignments resulting from temperature changes.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Response to Arguments

Applicant's remarks regarding the rejections under Solgaard et al. in view of Tobias in the last office action are persuasive. Both Solgaard and Tobias generally teach away from photodetector arrays operating at the wavelengths with which Solgaard is concerned. Moreover, Solgaard and Tobias alone do not disclose or suggest a single device embodiment which can perform both sequential and concurrent detection. Accordingly all previous rejections based on Solgaard have been withdrawn.

Applicant's remarks with respect to the previous rejections under Stafford are acknowledged but not persuasive. Stafford does teach a single device embodiment which can perform sequential or concurrent detection. As to applicant's comment that Stafford prefers a detector having a linear response over as wide a wavelength range as possible, this is not seen as precluding the use of an array of detectors. Although a highly linear detector is ideal for this device, Stafford teaches that any deviation from a linear response can be compensated by processing software. It is asserted that such post-compensation would be readily applied to an array of detectors. It is also asserted that an array of detectors offers additional flexibility in that each detector can be adjusted individually so that the array as a whole provides a suitably linear response, which can beneficially reduce the dependence on post-compensation software. Furthermore, although Tobias may not disclose using sequential and concurrent detection within the same device, Tobias was primarily relied upon for its teaching of the benefits of array detectors which themselves are otherwise already known in the art.

Conclusion

Any inquiry concerning this communication should be directed to Mike Stahl at (571) 272-2360. Official communications which are eligible for submission by facsimile and which pertain to this application may be faxed to (703) 872-9306. Inquiries of a general or clerical nature (e.g., a request for a missing form or paper, etc.) should be directed to the technical support staff supervisor at (571) 272-1626.

MJS

Michael J. Stahl
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John D. Lee
Primary Examiner

July 30, 2004